

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION

### Improvements in or relating to Pelvic Traction Belt

I, SAMUEL VARCO, M.D., a Citizen of the United States of America, of 392, Porter Avenue, Buffalo 1, New York, United States of America, do hereby declare the invention, 5 for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to a pelvic traction belt adapted to be placed around the waist and over the crest of the hip bones, and which is provided with extension straps adapted to be connected to a spreader and weights, so that a patient suffering from an 15 injury to the lower vertebrae or pelvis may be locally immobilised and placed under traction, but otherwise will be free to move his limbs and body.

Buck's extension, which has been widely 20 used for the treatment of injuries to the pelvic region, has been criticised as physiologically inadequate, and also because it substantially immobilises the patient, induces irritability, and is frequently the cause of 25 derivative ailments such as dermatitis and phlebitis. The present invention provides for the treatment of low back injury without any of these disadvantages.

According to the present invention there 30 is provided a pelvic traction belt for the treatment of low back injuries in human beings, comprising an abdominal band adapted to encircle the waist of a patient, said band having secured thereto means for 35 tightening the band around the waist, said band being of such a width as to overlie the pelvic crests and lower vertebrae and also to extend below the said pelvic crests, a pair of traction straps each having two branches, 40 connected to said band at each of the lateral portions thereof so as to be positioned at the front and back of the pelvic crests when the belt is worn, a pair of tension transmitting straps secured to the 45 band and extending angularly from the lower edge thereof toward the upper edge of

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the band to the lumbar region thereof, the branch of each traction strap which is at the back when the belt is in position on a patient being connected to one of said tension transmitting straps, each branch of said traction strap converging from its point of connection to the band toward an apex which, when the band is applied, will be below the thigh of the patient, said traction straps each having extension straps connected thereto at the apices of the branches and said extension straps being of such length that their ends will be below the foot of the patient when the leg is straight.

In the following portions of this description there will be described, with reference to the accompanying drawings, an embodiment of the invention, a practical technique for its use, and a summation of the results which have been obtained in its application to a substantial number of patients.

In the drawings :—

Fig. 1 is a side elevation of a patient reposing on a hospital bed, to whom the subject belt has been applied;

Fig. 2 is an end view of the same;

Fig. 3 is an enlarged fragmentary perspective of a standard or frame, suitable for use in applying traction to the belt;

Fig. 4 is an exterior plan of the belt, with a portion of one traction band broken away;

Fig. 5 is a fragmentary interior plan of the belt; and

Fig. 6 is a perspective of a spreader to which the traction bands and weights are connected.

As best shown in Figs. 4 and 5, the traction belt comprises an abdominal band, generally designated by the numeral 11, having an exterior surface 12 which may be of any suitable fabric, such as finely woven cotton. The cloth is cut with opposed upper and lower curved edges 13 and 14 which are generally convex at the ends 15 and 16 and 90 central back portion 17 and are somewhat concave at the lateral or hip bone portions

18 and 19. This formation facilitates smooth fitting to the contour of the body when the belt is applied. It is contemplated that the length of the belt may be varied, so that one 5 may be selected for the proportions of the patient, and that the width of the belt may be such as to overlie the crest of the ilium and the lower vertebrae. The illustrated belt has been copied from one suitable for a 10 patient having a girth of about forty inches, and its width ranges from about six inches to about five and one-half inches. These are satisfactory widths for the majority of cases where application of the belt is 15 indicated.

The fabric 12 is notched at the lateral regions 18 and 19, from the lower edge 14 approximately half way toward the upper edge 13, to provide upwardly pointed triangular recesses in which are sewed elastic 20 inserts or darts 21. Experience has shown that such darts have some advantages over inserts of generally trapezoidal form which extend from edge to edge, although the latter 25 have been used with satisfactory results. The ends of the band are fitted with buckles and tie straps, by means of which the belt may be drawn snugly around the body. Those on the right hand side 16 comprise a pair of 30 straps 22 of webbing, sewed to the edge of the belt, and over which may be slipped conventional over- and under-buckles 23. Between them, on a short loop 24 sewed to the belt, is a complementary hook 25. The left 35 side 15 is provided with a pair of hooks 26 and a strap 27, for co-operation with the securing means on the right hand side, as will be obvious from inspection.

It will be noted that the positions of the 40 hooks and buckles are alternated or staggered, so that, in applying the belt, a pull is exerted in each direction, that is, toward the right, and also the left. This has been found helpful in fitting the belt with uniform 45 compression of the body. It is also to be noted that the hooks and straps on the left hand side 15 are set back from the extreme end, to provide a shield 28 which will underlie the right hand 50 end 16, and thus preclude direct contact of the metal parts of the fasteners with the body. The straps 22 and 27, and the shield 28, are of such length—say four to eight 55 inches, that a reasonable range of adjustment is provided, making it unnecessary to have a custom built belt for each patient. The free ends of the straps may be tucked into loops formed by sewing a piece of tape 29 along one end of the belt.

60 The band 12 is reinforced at the ends 15 and 16 by pieces of webbing 31, extending from edge to edge, and sewn along the edges in the manner indicated by the dotted lines. Two additional reinforcing webs 32 are sewn 65 to the back portion 17, and these are spaced

sufficiently so as not to bear directly against the lumbar vertebrae. Additional strips of webbing are sewed to the outer face of the band 11, to provide means for applying tractive force. These include strips 35 and 36 70 normally disposed with respect to the edges of the belt, located at the left and right adjacent the bases of the elastic inserts 21, and on the ventral, which are reversely bent at the bottom edge 14 to extend angularly as 75 portions 37 and 38 toward the ends of the belt, and to terminate close to the upper ends of the strips 31. The strips 37 and 38 are sewed to the fabric 12 at their upper portions, as indicated by the dotted lines, but 80 they preferably are not sewed throughout the lower portions 39 and 41. Rather, they are given a certain looseness, as is illustrated by the bowing of these portions in the plan view of Fig. 4. Buckles 42 are positioned in these 85 loops.

Somewhat similar strips of webbing are sewed to the belt on the back portion thereof. These include normally disposed strips 43 and 44, reversely bent at the bottom edge 90 14 to provide angularly inclined unsewed or loose loops 45 and 46 which merge into sewed portions 47 and 48 respectively. The ends of the sections 47 and 48 meet at the top edge 13 and at the center of the belt, and they 95 overlap the bands 32. Again a suitable way of sewing is shown by the dotted lines. Buckles 49 are inserted in the loops so formed. It will be noted that the strips 43 and 44 are spaced at their lower ends from 100 the bases of the inserts 21.

Two strips of webbing 51 and 52, of a suitable length of say about five feet, are folded on themselves and have their free ends passed through the pairs of buckles 42 105 and 49, thereby providing two traction bands having angularly disposed branches, by means of which tractive force may be applied to the lower spine and pelvis. Each of these is provided with a slip ring 53, to which 110 is connected an additional length of webbing 54, 55, about three feet long, by passing one end through the ring and sewing the loop. The free ends of the strips 54 and 55 are adapted to be connected to a spreader 56, 115 which is best shown in detail in Fig. 6.

The spreader 56 may be made from an inexpensive piece of wood, about eighteen inches long, two and one-half inches wide, and nominal one inch thickness. Rectangular holes 57 are cut about two inches from the ends, and over them are placed buckles 58, which are secured to the spreader by loops 59 of webbing, and any suitable fastener, such as a screw or small bolt. A hole 120 61 is bored at the center of the spreader, to receive a length of sashcord 62, the concealed end of which is simply tied in a knot to provide a connection.

Referring next to Fig. 5, the inner

of the fabric band 12 is faced with a layer 64 of soft and non-irritating material, such as flannel, which is co-extensive with the band 12 except over the elastic inserts 21.

5 The diagonal dotted lines in Fig. 5, and also in Fig. 4, illustrate an acceptable way of sewing or quilting the two pieces of cloth together. The belt is finished around the edges and ends by a marginal binding tape 65, 10 which is interrupted, however, at the bases of the inserts 21. The foregoing is believed to describe in detail the construction of the traction belt.

The belt is applied to the patient in the 15 manner shown in Figs. 1 and 2. The foot of the bed 71 is elevated about four to six inches by blocks 72, and it is equipped with any suitable traction standard, such as that shown in Fig. 3. This consists of two up- 20 rights 73 and 74 having hooked upper ends which hang on the footrail 75, and which are interconnected by a cross-bar 76. The center of the cross-bar is provided with an aperture in which is slidably mounted a 25 column 77 having a yoke 78 at its upper end, in which is rotatably mounted a pulley 79. The sashcord 62, extending from the spreader 56, passes over the pulley 79 and is tied to the weights 81, as will be readily 30 understood.

The patient P is measured for correct size 35 of belt with an ordinary tape measure, passed around the waist at the level of the crests of the hip bones. The belt may be applied to the bare body, and the upper and middle strap and buckle pairs 22, 27, are taken up in such fashion as to impose a uniform compression on the body. The lower strap 22 need not be pulled up tightly, 40 and frequently it may be advisable to release all tension in it, particularly if unpleasant pressure is exerted on the bladder. This, of course, is a matter for consideration by the attending physician.

45 The upper half of the belt—that is, the portion above the apices of the inserts 21—should be above the iliac crest. The lateral sections 18 and 19 will then overlie the crests and extend on each side of the hip bones. 50 and, as previously noted, the central back portion 17 will be over the lumbar vertebrae and sacrum. The traction bands 51 and 52 are then adjusted in the buckles 42 to bring their apices in line with the knees. The free 55 ends of the straps 54 and 55 are passed through the holes 57 in the spreader 56, and are secured by the buckles 58 to position the spreader close to the foot of the bed when the patient is lying in a normal comfortable 60 position. The column 77 is elevated to such height as will preclude interference between the spreader and bed rail, and the end of the cord 62 is connected to the weights 81.

It will be observed that the traction applied 65 through the weights 81 is transmitted

through the straps 54, 55, through the divided paths provided by the straps 51 and 52, and thence over the entire pelvic and lower lumbar region, through the loops 39, 41, 45, and 46. In the course of applying the belt and the 70 traction loading, these loose loops are more or less flattened or molded to the body contour, and by making them as loose loops, it has been found that there is a better and more satisfactory distribution of the stress. 75 From an inspection of Figs. 1 and 4, it will be seen that the force is applied peripherally, and also downwardly on the sacroiliac joint, as a compressive force, and that there is also a stretching or tractive force applied to the 80 lumbar region. This distribution, which is believed to be anatomically and physiologically correct when used for low back injuries, is effected by means of the tightening of the waist band in conjunction with the location 85 of the traction bands on each side of the hip bones, and to the back.

With regard to the elevation of the foot of the bed, it has been found that the inclination of the body toward the head end provides all the counter traction that is required—no restraining body or shoulder harness being necessary. If the patient finds it uncomfortable to have his head lowered, it may be propped up with pillows, or, with the conventional hospital bed, the head section may be raised. The illustrated position is, however, the most efficient. Physicians will be guided by their own judgment as to the amount of weight loading. Eighteen pounds 100 is a good average value. Reports received until now reveal that as little as twelve, and as many as thirty pounds have been used, depending upon the size of the patient and the condition treated. 105

The invention is indicated in the treatment of substantially all low back skeletal injuries, as well as for sprains in the soft tissue and joints. Herniation of the nucleus pulposus in the lumbar intervertebral spaces—the so-called "slipped disc"—has been treated with gratifying results. Minor fractures of the lumbar processes, and of the sacral and iliac bones, also respond to the present treatment. The tractive pull decreases nerve pressure 115 and relaxes muscle spasm, and the injured region is adequately immobilised. Another application is as adjunctive treatment for low back pain such as occurs in spondylolisthesis. 120

An analysis of the cases which have been treated to date shows that the invention has a number of desirable advantages, when contrasted to previous procedures applied to the same conditions. A completely immobilised 125 patient rarely retains a good mental outlook or tone for a substantial length of time, and he is, of course, a problem for the attending physicians and the nursing staff. As indicated in Fig. 1, the present belt imposes only local 130

immobilisation. The patient may raise and bend his legs and body -- he may roll, or be rolled, from side to side. This relative freedom, coupled with the relief from pain inherent in tractive treatment, aids greatly in preserving the patient's morale and general comfort, and of course it greatly simplifies proper nursing care.

Such complications as dermatitis, swelling 10 of the ankles or knee joints, and thrombo-phlebitis, which heretofore have been experienced with traction imposed by adhesive tape applied to the skin, are fully avoided. The only difficulty which may be encountered 15 is unpleasant pressure on the crest of the ilium, or, with an overactive patient, a similar pressure on the outer surface of the thigh. These complaints when they occurred, were readily disposed of by inserting small 20 pads of sponge rubber, felt, or the like, between the belt and the afflicted area, whereupon the patient was restored to his attitude of tolerance.

One significant advantage of the present 25 invention is in its ability to enable the patient to be restored to ambulation in a comparatively short period of time. It will be recalled that in techniques requiring the knees to be flexed, even for such short periods of time 30 as a few days or a week, there is some atrophy and stiffening of the thigh muscles known as the quadriceps group. This requires post-operative treatment by way of massage to restore the muscles to a satisfactory 35 condition, and requires that the patient shall be hospitalised and disabled for a much longer period of time than otherwise would be required. This period of prolonged disability is eliminated by the present invention, inasmuch as the patient is free at all 40 times to exercise his limbs.

While the invention has been described with respect to a single embodiment, it will, of course, be understood that the belt may 45 be modified in various details without departure from its basic principles. It is therefore intended that the invention be accorded a scope consistent with that expressed in the following claims.

50 What I claim is: —

1. A pelvic traction belt for the treatment 55 of low back injuries in human beings, comprising an abdominal band adapted to encircle the waist of a patient, said band having secured thereto means for tightening the band around the waist, said band being of such a width as to overlie the pelvic crests and lower vertebrae and also to extend below the said pelvic crests, a pair of traction 60 straps each having two branches connected to said band at each of the lateral portions thereof so as to be positioned at the front and back of the pelvic crests when the belt is worn, a pair of tension transmitting straps 65 secured to the band and extending angularly

from the lower edge thereof toward the upper edge of the band to the lumbar region thereof, the branch of each traction strap which is at the back when the belt is in position on a patient being connected to one of said tension transmitting straps, each branch of said traction strap converging from its point of connection to the band toward an apex which, when the band is applied, will be below the thigh of the patient, said traction 75 straps each having extension straps connected thereto at the apices of the branches and said extension straps being of such length that their ends will be below the foot of the patient when the leg is straight. 80

2. A pelvic traction belt according to Claim 1, wherein the connection of each traction strap includes a tension transmitting strap connected to the branch which is at the front when the belt is in position on a 85 patient and to the band and extending angularly from the lower edge of the band to the pelvic region thereof to transmit pull exerted on said traction straps to the region of the body above the pelvic crests. 90

3. A pelvic traction belt according to Claim 1 or 2, wherein the connection of each traction strap includes tension transmitting straps secured to the belt in spaced relation at the lateral portions and normally disposed 95 with respect to the edges of the belt and positioned at the front and back of the pelvic crests when the belt is worn.

4. A pelvic traction belt according to Claims 1 to 3, wherein each angularly disposed tension transmitting strap is connected to one of the normally disposed tension transmitting straps by an interconnecting loose loop to which a branch of one of the traction straps is connected. 100

5. A pelvic traction belt according to Claim 1, wherein the band is of substantially non-elastic fabric and the lateral regions of the band adapted to overlie and bridge the pelvic crests are provided with yieldable inserts extending from the lower edge of the band to at least substantially half way to the upper edge thereof. 105

6. A pelvic traction belt according to any one of the preceding claims, including 115 reinforcing strips transverse to and sewn to the band in spaced relation at the back thereof and positioned on either side of the lower vertebrae when the belt is worn.

7. A pelvic traction belt according to 120 any one of the preceding claims, wherein the band has free ends adapted to overlap each other over the abdomen of a patient and hooks and buckle straps secured to and adjacent said ends whereby the band may be 125 drawn tightly around the waist with one end overlapping the other to provide a protective shield.

8. A pelvic traction belt according to Claim 7, including reinforcing strips sewn to 130

the band between the upper and lower edges of the band at the end portions thereof.

9. A pelvic traction belt according to any one of the preceding claims, including a 5 facing of soft and non-irritating material sewn to the inner surface of the band.

10. A pelvic traction belt according to any one of the preceding claims including a spreader bar provided with means for ad- 10 justably securing the ends of the extension straps and with means for attaching traction

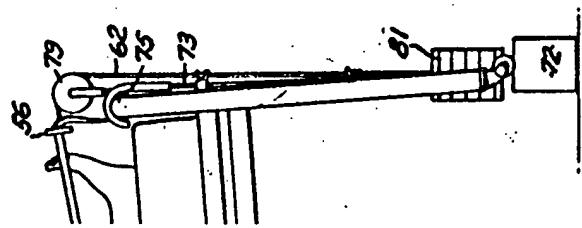
weights thereto, said securing means being spaced a sufficient distance that tractive effort applied to the bar will be applied to the pelvic and lumbar regions.

15

11. A pelvic traction belt substantially as shown and described with reference to the accompanying drawings.

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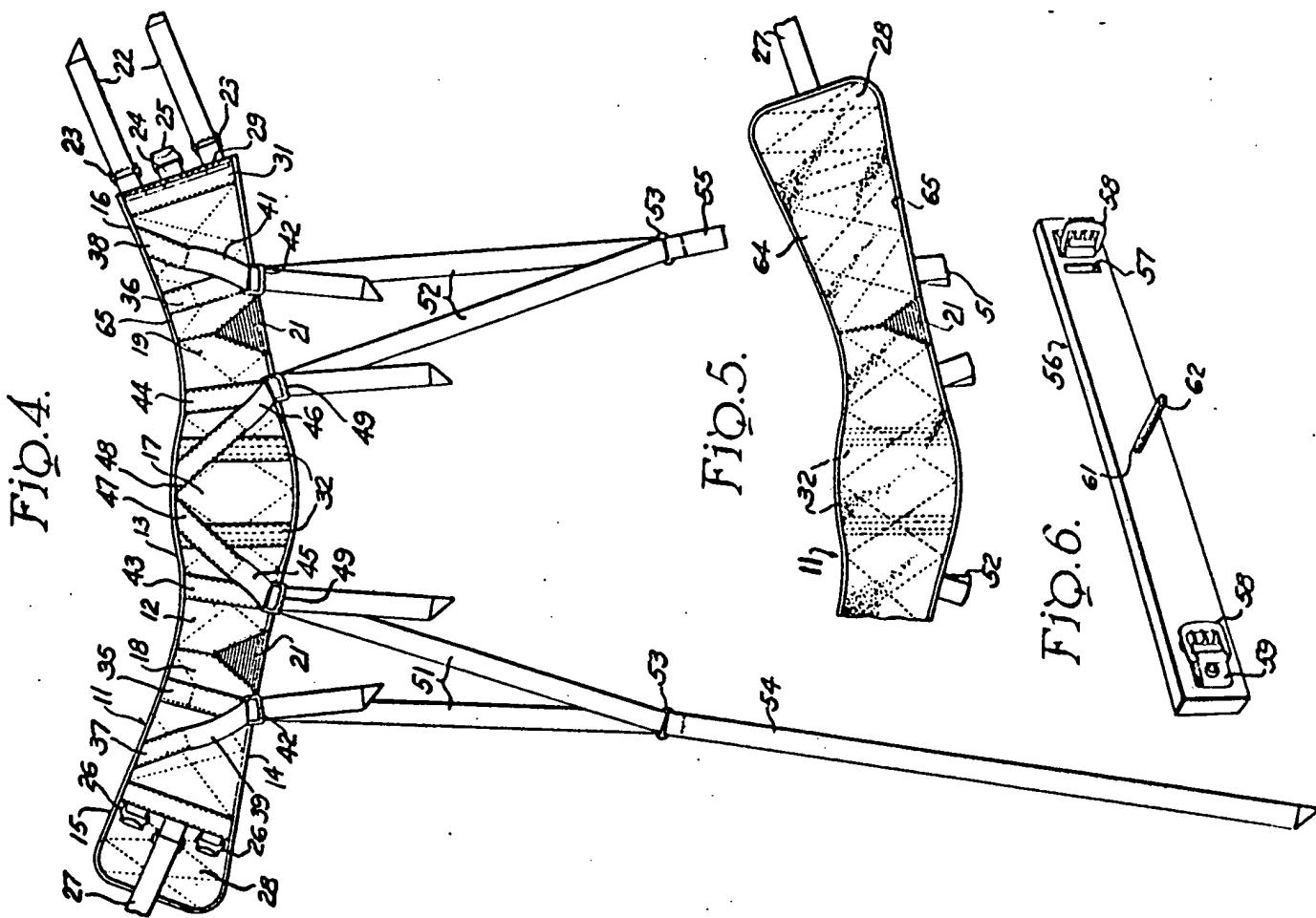
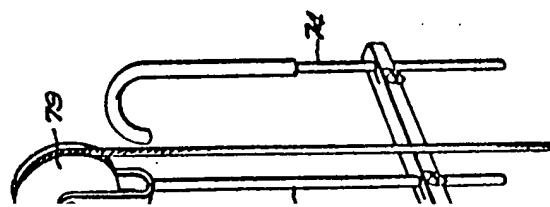
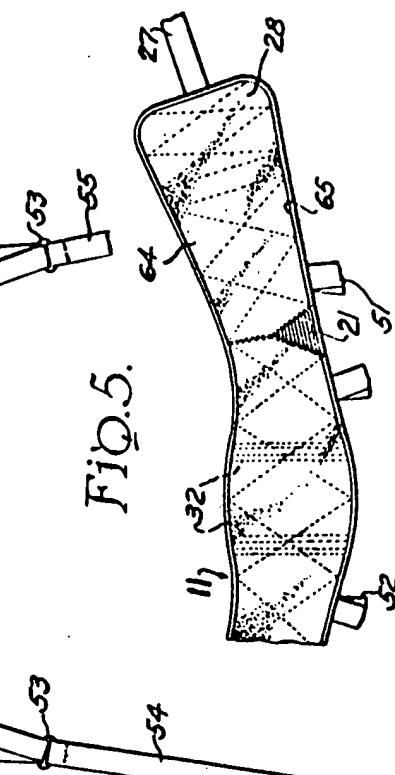


Fig. 5.



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